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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/002,317	10/25/2001	Thomas K. Wood	9842-273-999	2979
24341	7590	06/22/2004	EXAMINER	
MORGAN, LEWIS & BOCKIUS, LLP. 3300 HILLVIEW AVENUE PALO ALTO, CA 94304			MARX, IRENE	
			ART UNIT	PAPER NUMBER
			1651	

DATE MAILED: 06/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/002,317	Applicant(s) WOOD ET AL.	
	Examiner Irene Marx	Art Unit 1651	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
 4a) Of the above claim(s) 1-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 24-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
 a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

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The amendment after final filed 6/1/04 is acknowledged. Claims 24-43 are being considered on the merits.

Claims 1-23 are withdrawn from consideration as directed to a non-elected invention.

The finality of the rejection of the last Office action is withdrawn inasmuch as claims 35, 36 and 38-43 are not specifically included in any rejections and in view of the new grounds of rejection *supra*.

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 15-16, 19, 21, 23-25, 28, 30 and 32-43 are provisionally rejected under the judicially created doctrine of double patenting over claims 1-2, 5, 8-12, 16, 18-19, 22, 25-26, 30, 33, 36-40, 43, 46-48, 51-52 and 55 of copending Application No. 09/568872.

Although the conflicting claims are not identical, they are not patentably distinct from each other because both sets of claims are drawn to compositions comprising an aluminum substrate and a biofilm and methods of protecting said substrates from corrosion by the application of said biofilms.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claims 27 and 37 are/remain rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 27 is/remains vague and indefinite in the recitation of "mild steel 1010". This does not appear to be a term of art, and it is unclear what this terminology is intended to encompass.

Applicant's contention that this constitutes a particular grade of steel is noted. However, the specific nature of this grade of steel is not of record.

The article now proffered from the website of Burns Stainless does not clearly delineate whether the properties for Mild Steel 1010 disclosed are standard as determined by the American Society for Testing Materials or whether the enumerated characteristics are those of a particular product provided by this company.

Therefore the rejection is deemed proper and it is adhered to.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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Claims 24-26, 28, 31, 33-36, 38, 40-43 are rejected under 35 U.S.C. 102(e) as being anticipated by Wood *et al.* (U.S. Patent No. 6,630,197.)

The claims are directed to reduction of corrosion by providing a metal and applying on an exterior surface a protective bacterial biofilm that reduces corrosion formed by bacteria that secrete a polyanion, such as polyphosphate, polyglutamate or polyaspartate.

Wood *et al.* fully discloses a process for the reduction of corrosion by providing a metal, including mild steel, aluminum, copper, titanium, etc. and applying on an exterior surface thereof a protective bacterial biofilm that reduces corrosion comprising bacteria such as *Pseudomonas* or *Bacillus* that secrete a polyanion, such as a polyamino acid, wherein polyglutamate and polyaspartate are indicated as particularly suitable. See, e.g., col. 4, lines 4218, lines 20-60.

Claims 24-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wood *et al.* (U.S. Patent No. 6,630,197) taken with Hardoyo *et al.*, of record.

The claims are directed to reduction of corrosion by providing a metal and applying on an exterior surface a protective bacterial biofilm that reduces corrosion formed by bacteria that secrete a polyanion, such as polyphosphate, polyglutamate or polyaspartate.

The reference differs from the claimed invention in that it does not disclose an *E. coli* strain that is genetically engineered to secrete polyphosphate, a polyanion. It is noted that Wood *et al.* strongly suggest the use of genetically engineered bacteria to produce the desired antimicrobial biofilms. See, e.g., col. 33, wherein the use of genetically engineered *B. subtilis* WB600, for example, is specifically recommended, lines 26-40. It would have been within the ordinary skill in the art to produce a strain as required.

In addition, Hardoyo *et al.* disclose an *E. coli* strain which has been genetically engineered to secrete polyphosphate, a polyanion. Hardoyo *et al.* discloses precisely the same strain MV1184(pBC29, pEP02.2) that is touted in the instant invention as providing superior results (Hardoyo, page 3488, Specification page 19). Therefore, one of ordinary skill in the art would reasonably have expected this strain to likewise release polyphosphates. See also, page 3488, paragraph 2 for the explicit release of polyphosphate. One of ordinary skill in the art would reasonably have expected this strain to produce a protective biofilm.

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Accordingly, one of ordinary skill in the art would have had a reasonable expectation of success in using a biofilm forming *E. coli* or *Bacillus* that secretes a polyanion such as polyphosphate or polyglutamate in a process of reducing corrosion on a surface of any metal including aluminum, copper, titanium, nickel, alloys thereof and various types of steel, in view of the teachings of Wood *et al.*. In addition one of ordinary skill in the art would have reasonably expected that a bacterial biofilm would protect the surface of these metals when immersed in liquids such as culture media or artificial seawater. See, e.g., Woods *et al.* wherein biofilms on steel are tested in Luria-Bertani medium.

In addition, the adjustment of the thickness of the biofilm by optimization of conditions such as culture media and length of growth of the bacteria, identified as result-effective variables cited in the references would have been *prima facie* obvious to a person having ordinary skill in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to modify the process of reduction of corrosion disclosed by Wood *et al.* by substituting recombinant bacteria such as *E. coli* or *Bacillus* that secrete a polyanion such as polyphosphate, as suggested by the teachings of Hardoyo *et al.* for the expected economic benefits of minimizing losses due to metal corrosion by optimizing the protective properties of bacterial biofilms on metals vulnerable to corrosion by addition of polyanions.

Thus, the claimed invention as a whole was clearly *prima facie* obvious, especially in the absence of evidence to the contrary.

Claims 24-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jayaraman *et al.* (1997) taken with Sekine *et al.*, both of record, Groth *et al.*, (U.S. Patent No. 5,543,490), Matsukawa *et al.* (U.S. Patent No. 5,527,854), Dilorio *et al.* (U.S. Patent No. 6,533,938) and Hardoyo *et al.*

The claims are directed to reduction of corrosion by providing a metal and applying on an exterior surface a protective bacterial biofilm that reduces corrosion formed by bacteria that secrete a polyanion, such as polyphosphate, polyglutamate or polyaspartate.

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Jayaraman *et al.* disclose the reduction of corrosion by providing a metal and applying on an exterior surface a protective bacterial biofilm that reduces corrosion formed by a bacterium, such as *E. coli* (See, e.g., page 64, et seq.).

The reference differs from the claimed invention in that the reference is silent regarding the secretion of a polyanionic chemical composition by the biofilm forming bacteria, including genetically engineered bacteria.

However, it is well known in the art that anionic polymers reduce corrosion, as adequately demonstrated by Sekine *et al.* (See, e.g., page 3173, Conclusions). In addition, Groth *et al.* disclose corrosion inhibiting properties on brass in artificial seawater of compositions which comprise polyphosphate (See, e.g., bridging paragraph between col. 5 and 6); and Matuskawa *et al.* disclose the use of polyglutamate as corrosion inhibitors on aluminum, for example, in an aqueous environment (See, e.g., col. 24, lines 53-67).

In addition, Dilorio *et al.* adequately demonstrate that *Bacillus licheniformis* is recognized in the art as a suitable producer of polyglutamates (See, e.g., bridging paragraph between col. 10 and 11).

Furthermore, Hardoyo *et al.* disclose an *E. coli* strain which has been genetically engineered to secrete polyphosphate, a polyanion. Hardoyo *et al.* discloses precisely the same strain MV1184(pBC29, pEP02.2) that is touted in the instant invention as providing superior results (Hardoyo, page 3488, Specification page 19). Therefore, one of ordinary skill in the art would reasonably have expected this strain to likewise release polyphosphates. See also, page 3488, paragraph 2 for the explicit release of polyphosphate. One of ordinary skill in the art would reasonably have expected this strain to produce a protective biofilm.

Accordingly, one of ordinary skill in the art would have had a reasonable expectation of success in producing a protecting biofilm on metal by culturing *E. coli* or other bacteria, such as *B. licheniformis*, that secrete polyphosphate or polyglutamate in a process of reducing corrosion on a surface of any metal including aluminum, copper, titanium, nickel, alloys thereof and various types of steel. In addition one of ordinary skill in the art would have reasonably expected that a bacterial biofilm would protect the surface of these metals when immersed in liquids such as culture media or artificial seawater. See, e.g., Jayaraman *et al.* Fig 1a, b, page 64, wherein biofilms on steel are tested in Luria-Bertani medium.

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In addition, the adjustment of the thickness of the biofilm by optimization of conditions such as culture media and length of growth of the bacteria, identified as result-effective variables cited in the references would have been *prima facie* obvious to a person having ordinary skill in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to modify the process of reduction of corrosion disclosed by Jayaraman *et al.* by substituting bacteria, including *E. coli* that secrete a polyanion such as polyphosphate or polyglutamate, as suggested by the teachings of Sekine *et al.*, Groth *et al.*, Matsukawa *et al.*, and Hardoyo *et al.* for the expected economic benefits of minimizing losses due to metal corrosion by optimizing the protective properties of bacterial biofilms on metals vulnerable to corrosion by addition of polyanionic polymers.

Thus, the claimed invention as a whole was clearly *prima facie* obvious, especially in the absence of evidence to the contrary.

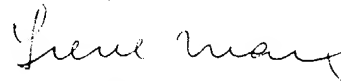
Applicants' arguments are moot in view of the new grounds of rejection.

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Irene Marx whose telephone number is 571-272-0919. The examiner can normally be reached on M-F (6:30-3:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael G. Wityshyn can be reached on (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-9000.



Irene Marx
Primary Examiner
Art Unit 1651